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Exploratory Analysis of the E-government E-skills of Serbian Citizens and Their Ability to Use E-government Services with Special Emphasis on the Regional Differences

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Abstract The topic of the e-government e-skills of Serbian citizens has been largely unexplored. Thus, the study aims to explore the citizens' current level of e-government e-skills competencies. The data were collected from 2,894 citizens through a paper survey and analyzed using ANOVA and EFA. The empirical results suggest that there are significant differences between the regions, with the citizens of the Belgrade region being significantly more proficient than citizens in other regions of Serbia in all areas except digital certificate skills. The empirical results also suggest that women are more proficient than men, that the 65+ age group's digital skills are completely inadequate, and that education level is a key factor.

Keywords: • e-government • digital literacy • digital skills • e-readiness • regions

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1 Introduction

Governments all over the world have recognized the importance of e-government initiatives which has led to constant improvements in this area (Joseph & Olugbara, 2018; Saptono et al., 2023:1). The biannual UN e-government survey (United Nations, 2020; United Nations, 2022) is probably the publication that most clearly shows this constant growth in e-government capabilities in the whole world. In the year 2020 (United Nations, 2020), only eight out of the 193 UN countries were classified as countries with a low e-government index. In the 2022 (United Nations, 2022) report, this number has decreased to only seven while on the other side of the spectrum, the number of countries with very high EGDI index values increased from 57 to 60. The e-government or electronic government represents a part of the government that the user accesses electronically (Dukic et al., 2017). In the broader sense, it includes any form of information and communication technology that provides users with electronic access to government services (Dukic et al., 2017; Alghamdi et al., 2011). In a narrower sense, the term e-government is normally considered to signify government services offered over the Internet (Dukic et al., 2017; Alateyah et al., 2013; Alghamdi et al., 2011). The e-government brings multiple advantages to all of society. Paperless administration is both ecological and economical (Alshehri & Drew, 2010; Khaemba et al., 2017); it is also available 24 hours a day. The fact that e-government is digital also makes it far more transparent than analog government (Joseph & Olugbara, 2018; Alshehri & Drew, 2010). Electronic procedures performed by electronic systems are user-agnostic since they work the same way for all users which eliminates both corruption (Minović et al. 2014; Alshehri & Drew, 2010) and many forms of discrimination. Also, the e-government can much more easily be monitored and managed (Alguliyev & Yusifov, 2015). In times like the COVID-19 crisis, an additional advantage is that it makes social distancing easier and is definitely more practical than communicating by paper mail (Burlacu et al, 2021, Hodžić et al., 2021:160; Shao et al., 2022).

E-government initiatives were first implemented in developed countries. In developing countries, they face additional challenges (Bogdanovic-Dinic et al., 2013) such as lack of resources and an underdeveloped infrastructure (Bogdanovic-Dinic et al., 2013). Recently, however, with technological progress, the cost of providing Internet services has been going down which allowed more countries to develop their e-government. The E-Government Survey of 2020 (United Nations, 2020) marks only 4% of the UN countries as countries with a low e-government index. The low level of digital skills of e-government users is one of the biggest challenges in e-government (Khan et al., 2010).

1.1 E-government in the Republic of Serbia

The beginning of e-government in Serbia can be traced back to the nineteen eighties (Šereš & Horvat, 2011) when Serbia was one of six republics of SFR (Socialist Federal Republic of) Yugoslavia. In this early stage (Šereš & Horvat, 2011), the first information systems of government bodies were created as well as the legislation that regulated their use. SFR Yugoslavia was later dissolved into multiple countries. The period (Šereš & Horvat, 2011) between 1991 and 2000 was characterized by many ambitious initiatives that were seldom implemented. From 2000, these initiatives started to yield the first significant results (Šereš & Horvat, 2011). However, until 2007, e-government infrastructure and services (Vidojevic, 2020) in the Republic of Serbia were being implemented mostly at the individual government bodies level and no government body was tasked specifically with developing the e-government. The first institution that was tasked with organizing the implementation of the e-government was the Republic Office for Informatics and the Internet (Vidojevic, 2020; Šereš & Horvat, 2011). It was formed in 2007 (The law on ministries, 2007) as an independent office under the oversight of the Ministry of telecommunications and information society. Together with the e-government, it was tasked with handling a rather wide area of different tasks. In 2007 (Šereš & Horvat, 2011), it launched the first e-government portal of the Republic of Serbia. After administrative changes (The law on ministries, 2011) in 2011, jurisdiction over the field of e-government was given to the Digital Agenda Directorate as part of the Ministry of culture, information and information society. Three years later, in 2014, the Directorate for electronic government (The law on ministries, 2014) was created as a part of the Ministry of Public administration and local self-government. In 2017, the Directorate ceased to exist and a new government body, the Office for Information Technologies and E-government (Vidojevic, 2020) was formed as an independent office directly under the Office of the prime minister. The new office got a much wider jurisdiction and authority to provide IT services to all other government bodies with the exception of the government bodies that already had their own e-government solutions. In parallel with the development of the e-government portal at the country level, all local governments have also implemented their own e-government solutions. Currently, the e-government landscape in Serbia is comprised of a central e-government portal, e-government systems of government bodies which already had their e-government solutions before the portal and e-government systems, mostly websites, of local governments. Compared to other countries globally according to (United Nations, 2018; United Nations, 2020), Serbia had a high EGDI (E-Government Development Index) and was ranked 49th and 58th out of 193 UN member states in the 2018 and 2020 surveys, respectively. In 2022 (United Nations, 2022), Serbia was for the first time a country with a very high EGDI and was ranked 40th out of 193 countries. Compared to EU countries, according to the I-DESI 2020 (International Digital Economy and Society Index) (Foley et al., 2021), with an I-DESI score of 37.7, Serbia

is ranked just a little bit above the bottom 4 EU member average of 36.9 – the same relative position as in the I-DESI 2018 (Foley et al., 2018) survey.

This paper consists of five sections: introduction, literature overview, research, discussion and conclusions. The research section explains the problem statement, process of sample selection and the process of questionnaire development. The discussion section discusses the results, and the conclusions section contains conclusions, implications, limitations and recommendations for further study.

2 Literature overview

The first concepts that come to mind when digital skills are mentioned are the concepts of digital and computer literacy. Although sometimes used interchangeably, these two concepts do have a different meaning. Computer literacy (Bawden, 2001) is considered to be a skill-based literacy which is comprised of a set of skills needed to use computers. Digital literacy (Bawden, 2001; Pangrazio et al. 2020) on the other hand is comprised of the skills needed to function in a digital world. To use e-government services, citizens have to be computer-literate. To be considered computer-literate (Statistical Office of the Republic of Serbia, 2011), persons have to be proficient in four computer activities: text editing, working with tables, sending and receiving e-mails and using the Internet. Partially literate persons have some of the previously mentioned skills, but not all of them. However, although these four skills are important, they are only a subset of skills needed for the efficient and effective use of e-government services.

In the EU, in the field of digital competences, the EU Digital Competence Framework for Citizens (DigComp) (Carretero et al., 2018) is recognized as the main framework for the defining and identification of key areas of digital competences. This framework defines five areas of digital competences: information and data literacy, communication and collaboration, creation of digital content, information security, and problem-solving (Carretero et al., 2018). These five areas consist of twenty-one competences (Carretero et al., 2018). Obviously, the concept of digital competences is much broader than the concept of computer literacy. For this reason, this model is much more suitable to be used in e-government e-skills research.

E-government research covers both the service providing and service consumption side of the e-government (Reddick, C.G., 2005; Khan et al., 2010). Research into the service providing side of e-government is much more predominant (Khan et al., 2010). The majority of articles that were retrieved while searching indexing databases for literature on the topic of the paper cover the provider side of e-government services. Articles that cover the consumer side of e-government mostly focus on the e-government skills of government employees (Dukic et al., 2017,

Jukic et al. 2014). In the literature (Khan et al., 2020; Mensah, 2018; Ndou, 2004), e-government services are further divided into groups based on the e-government services consumer. These four relationships are (Khan et al., 2020; Mensah, 2018; Ndou, 2004; Alghamdi et al., 2011; Hodžić et al., 2021:160): government to government (G2G), government to business (G2B), government to citizen (G2C) and government to employee (G2E).

In the context of e-government, there are many research topics that include a citizen's digital skills as one of the contributing factors (Khan et al., 2020; Mensah, 2018; Akram & Malik, 2012). Topics of e-readiness (Dukic et al., 2017; Angeleski et al., 2014; Joseph & Olugbara, 2018; Khan et al., 2020; Mensah, 2018; Akram & Malik, 2012; Shalini, 2009), digital inclusion (Friemel, T. N. 2016; Chohan & Hu, 2020), e-government adoption (Alateyah et al., 2013) are just some of these topics that have received much more research attention than the topic of citizens' digital skills alone. Authors that have researched digital skills have three different approaches. The first approach is to make a comprehensive list of all digital skills possible. An example of this is the study (Khan et al., 2010) where authors have created a list of 81 skills. The problem with this approach is that there is no definitive list since technology is constantly advancing and there are always some new skills, (Chohan & Hu, 2020) and also e-government implementations differ significantly between the countries. However, this still remains the most precise approach. The second approach is to present the respondents with a comprehensive list of skills and then apply a statistical procedure to reduce the number of relevant factors for further analysis (Dukic et al., 2017). This approach solves the problems from the previous approach but is not as detailed as the first approach that we mentioned. The third approach is the simplest - it consists of asking respondents to rate their e-government capabilities on a scale of 1 to 5 (Jukic et al., 2014; Đurašković, 2018:38) or asking them if they use personal computers (Angeleski et al., 2014).

As for e-government research in Serbia, not much research (Đurašković, 2018:37) was conducted on the topic of citizens' e-skills for e-government. Research on digital skills has mostly focused on various groups and their use of the Internet (Kuzmanović et al., 2019; Teodorović et al., 2019; Wurzburger et al., 2023) or on the government employees (Bianco & Trutkowski, 2017; CESID, 2021). In the absence of more recent research, government strategies cite the last decennial census from 2011 (Statistical Office of the Republic of Serbia, 2011) as a key reference (Ministry of trade, telecommunications and tourism, 2020; Ministry of public administration and local self-government, 2020). A lot has changed since then. Many digital services and technologies that are in widespread use today did not even exist in 2011. However, the development strategies of e-government of the Republic of Serbia do identify the insufficient level of information technology skills as one of the three most significant barriers in implementing e-government

(Ministry of trade, telecommunications and tourism, 2020). The implementation plan of the Republic of Serbia's National strategy for the development of digital skills 2020-2024 (Ministry of trade, telecommunications and tourism, 2020) recognizes a detailed assessment of citizens' digital skills at both state and local government levels as a crucial goal.

3 Research

3.1 Problem statement

As previously stated, research on the G2C component of e-government is lagging behind the other components of e-government. This is especially true in Serbia where research on this topic has been completely inadequate and only a few studies covered anything remotely similar (Đurašković, 2018:37, Kuzmanović et al., 2019; Teodorović et al., 2019; Wurzburger et al., 2023). Other e-government components have received much more attention and funding. However, after investing significant resources into developing the e-government infrastructure, the government is starting to realize (Ministry of trade, telecommunications and tourism, 2020; Ministry of public administration and local self-government, 2020) that without citizens who can fully utilize e-government systems, the true potential of e-government is not fully realized. Previous studies never dealt in detail with skills of the citizens at the local government level in the context of e-government and only a handful attempted to do the same at the national level. This study fills this huge gap that was identified in the literature and further explores the relationships between the relevant factors. A better understanding of the state of the citizens' digital skills for e-government will allow the authorities to better understand and monitor further developments in this field and make better decisions.

Our research goals are:

1. Explore the level of digital skills of the citizens of Serbia in the context of their ability to use e-government services.
2. Explore if there are significant differences among the citizens' level of skills at the regional level.
3. Determine common factors among the variables that measure the level of citizens' digital skills.
4. Explore the differences among the identified factors for Serbian citizens depending on gender, age, the educational as well as at the regional level.

In order to accomplish the goals, we conducted a paper survey. The survey was conducted using a structured questionnaire. The process of creating the questionnaire included doing a detailed literature review on the topic, consulting with experts in the field and multiple rounds of pre-testing. Seven topics were

determined to be of interest for the study. They are: basic device skills, operating systems and application use skills, Internet skills, communication skills, solving technical problems skills, basic e-government and specialized e-government skills. After the main topics were selected, a list of all e-skills on those topics that we found in the literature was created. Then, all the skills from the list that were duplicates or very similar were eliminated. Next, we removed questions from the list that were not satisfactory. For a question to remain on the list, it had to pass reliability and validity tests. Questions that were not understandable were immediately removed from the list, followed by those for which respondents provided varying answers in consecutive testing. In the end, we made a list of 60 municipalities to which we later sent the questionnaire, and we visited their websites to ensure that the skills in the questionnaire are relevant to the research and all the skills that were not relevant in the context of the Serbian e-government were removed. The final questionnaire consisted of 33 questions, 30 of which were skill-based while 3 were demographics questions. A paper survey was selected since survey data had to be gathered in a way that even a completely computer illiterate person can fill. To address the problem of data entry, the survey was printed in two colors - red and black, so that it can be easily processed by an OCR service.

3.2 The sample

The target population included all citizens of the Republic of Serbia who can interact with the government, which effectively means all citizens older than 16. According to the 2011 census (Statistical Office of the Republic of Serbia, 2011), this population is approximately 6 million. The minimal sample size to represent this population, according to (Krejcie & Morgan, 1970), is 385. The convenience sampling strategy was used as a data collection strategy. Statistically, Serbia is divided into five regions, which are then divided into 29 districts that are further divided into 145 municipalities (The Statistical Office of the Republic of Serbia, 2011). Due to political circumstances, the Kosovo and Metohija region was not included in this survey. That left us with four statistical regions: Belgrade, Vojvodina, Eastern and Southern Serbia, and the Sumadija and Western Serbia regions. For the sake of simplicity in the rest of the article, Eastern and Southern Serbia will be abbreviated to Eastern Serbia and Sumadija, and the Western Serbia region will be abbreviated to Western Serbia. Surveyed municipalities were selected to represent all four regions equally in the sample. Out of four statistical regions, we explored only Vojvodina as a region (Autonomous province) in an administrative sense as it has its own regional government. Belgrade is a city and the capital of Serbia. The Western and Eastern regions are regions in a statistical sense only since there is no regional government. Only municipalities with a population of more than 35,000 were included in the research. This choice was made out of convenience, which affects research generalizability but is acceptable for explorative research. The surveys were then sent to 60 selected municipalities to be

administered by the local government offices. A total of 5,000 questionnaires were sent, and 2,949 (58.98%) were received back. Of this number, 2,894 (98.13%) valid responses were used in the analysis, which is more than the 385 needed.

3.3 The questionnaire

As previously mentioned, the first 30 questions were about e-skills. Citizens were asked to grade the level of their e-skills on a five-point scale ranging from 1 to 5 where 1 indicates no skill and 5 that they have the highest level of that skill. The last three questions contained demographics questions about the level of education, gender, and age group. The survey consisted of 8 groups of questions created by handpicking skills from the literature (Khan et al., 2010) but mostly from DigComp 2.1 (Carretero et al., 2018) and the National standards for essential digital skills (UK Department for Education, 2019) frameworks according to the goals of the research.

The first group was about the basic device skills of powering on devices and using basic input methods like the mouse and keyboard. In total, there were five questions in this group: "I know how to power on a computer" (1), "I know how to power on a smartphone" (2), "I know how to power on a tablet" (3), "I know how to use the mouse and keyboard" (4) and "I know how to use the touchscreen" (5).

The second group consisted of skills for operating systems and applications use: "I know how to use and set accessibility tools" (6), "I know how to install and run applications" (8), "I know how to open, read and save data in files" (15), "I know how to work with files and folders" (16), "I know how to use applications to enter, edit and format data" (20), "I know how to capture and reproduce images, sound, and video" (21).

The third group was about Internet skills. It consisted of four questions: "I know how to connect to the Internet" (7), "I know how to use an Internet browser" (9), "I know how to find information on the Internet by using a search engine" (10), "I know how to use hyper-links, menus and the other navigation elements of a website" (14).

The fourth group of questions included questions about communication skills. It consisted of three questions: "I know how to communicate with others via mobile phone" (11), "I know how to communicate with others via VOIP services (Skype, Viber)" (12), and "I know how to communicate with others using email" (13).

The fifth group was about solving technical problems. It consisted of three questions: "I know how to recognize when there is a technical problem with the device that I am using" (17), "I know how to solve simple technical problems with

the device that I am using" (18) and "I know how to ask for help when I come across a technical issue that I can't solve by myself" (19)

The sixth group consisted of questions about basic e-government skills. There were seven questions in this group: "I know how to fill out a digital form on the website" (22), "I know how to pay for services over the Internet" (23), "I know how to use digital devices and Internet services safely" (24), "I know how to download a file from an Internet website and save it on my device" (25), "I know how to print a file that I have on my computer" (26), "I know how to scan a document and save it on the computer" (27), "I know how to send an electronic document via email" (28).

The seventh group consisted of questions about the specialized level of e-government skills. There were two questions in this group: "I know how to use a digital certificate" (29) and "I know how to electronically sign a document" (30).

The last group consisted of demographic questions about the respondent's level of education (31), gender (32), and age group (33).

3.4 Results

To address the first goal of the research, descriptive statistics were calculated for each group of questions. Descriptive statistics provide a summary of the main aspects of the data (Pallant, J.F., 2016). Here they were used to provide a snapshot of the data's main characteristics. Detailed demographics can be observed in Table 1. More females completed the survey, 54.7%, compared to 45.3% of male respondents. However, this is still within the limits of being gender balanced. The gender ratio remains balanced for all four regions. The two prominent groups by level of education are the secondary school and university group. The secondary school group consisted of 1,131 individuals, or 39.1% of the respondents, and the university-educated group had 38.9%, or 1,126 of the total respondents. In order to fulfill the first goal of the research and determine the level of digital skills of the citizens, descriptive statistics analysis was performed for all seven groups of questions.

Descriptive statistics for the basic device skills group can be found in Table 2. They show that, on average, the respondents have indicated that they have the highest level of skills for the skills covered in the first group of questions, with the highest mean value of 4.62 for powering on a computer and the lowest of 4.46 for powering on a tablet. For the operating systems skills group (Table 3), the level of skills is much lower, with the using and setting accessibility tools skill having the highest mean value of 4.34 and the skill of using applications to enter, edit, and format data having the lowest mean of 3.78. In the Internet skills group (Table 4), the highest mean is 4.47 for both connecting to the Internet and finding information via a search

engine. The lowest mean is for the skills of using hyperlinks and the menus' other navigation elements (3.77). In the communications skills group (Table 5), mean values range from 4.66 for mobile communication to 4.16 for e-mail communication. As expected (Table 6), the troubleshooting technical issues skills mean the range is relatively lower than previous groups, with the solving technical problems skill mean of 3.74 being the lowest and knowing how to ask for help with 4.08 being the highest. For the basic e-government skills group (Table 7), mean values range from 3.57 for paying for services to 4.04 for printing files skills. The lowest mean level of skills was recorded for the last group, the specialized e-government skills (Table 8). Mean values ranged from 2.97 for electronically signing a document to 3.05 for using a digital certificate, with a median of 3 and mode of 1.

In order to accomplish the second goal of the research, one-way ANOVA was performed on the first 30 questions to determine if there are statistically significant differences among the different regions. One-way Analysis of Variance (ANOVA) (Pallant, J.F., 2016) is a statistical method used to test the equality of three or more means. The term "one-way" means that there is only one independent variable (factor) involved. While ANOVA can determine that at least two groups are different, if the differences are significant, a post hoc test needs to be conducted to determine which groups have a difference in means. Therefore, the Bonferroni post hoc test was conducted to determine the differences. ANOVA detected statistically significant differences between regions for the first twenty-eight out of thirty questions. Only for questions 29 and 30, there were no significant differences between the regions. Results of the ANOVA for the first group can be observed in Table 9, and detailed results of the post hoc analysis among the regions can be found in Table 10 at the end of the paper. ANOVA found statistically significant differences at the 0.05 level, with Belgrade results being better than others for questions 2, 3, and 5 and Belgrade and Vojvodina respondents having better results than Eastern and Western Serbia on questions 1 and 4. Results for the operating system group are similar, with the Belgrade region being significantly better than other regions for the majority of questions (Tables 11 and 12). A similar theme continues for Internet skills, with Belgrade again being significantly better than other regions, but this time there is also a significantly better result for Vojvodina compared to the Eastern Serbia region (Tables 13 and 14). Vojvodina again has better results than eastern and western Serbia for the communication skills group, but Belgrade is still significantly better (Tables 15 and 16). Respondents in the Belgrade region graded their skills in solving technical problems significantly higher than all of the other regions (Tables 17 and 18). The Bonferroni test for the basic e-government skills group follows the same pattern, with the Belgrade region results being significantly better than other regions' results for most questions (Tables 19 and 20).

3.5 Factor analysis results

In order to accomplish the third goal of the research, EFA was performed using principal component analysis and promax rotation. Exploratory Factor Analysis (EFA) is a statistical technique used mainly to uncover the underlying structure of a relatively large set of variables. Reducing the data from many variables to fewer dimensions makes it easier to understand, visualize, and further analyze. Exploratory in nature, it aims to identify patterns and relationships among variables. In the current research, it was primarily used to reduce the number of variables for further analysis. The minimum factor loading criteria was set to 0.50. The communality of the scale, which indicates the amount of variance in each dimension, was also assessed to ensure acceptable levels of explanation. The results show that all communalities were over 0.50.

An important step involved weighing the overall significance of the correlation matrix through Bartlett's Test of Sphericity, which provides a measure of the statistical probability that the correlation matrix has significant correlations among some of its components. The results were significant, $x^2(n = 2894) = 105758.774$ ($p < 0.001$), which indicates its suitability for factor analysis. The Kaiser–Meyer–Olkin measure of sampling adequacy (MSA), which indicates the appropriateness of the data for factor analysis, was 0.98. In this regard, data with MSA values above 0.800 is considered appropriate for factor analysis. Finally, the factor solution derived from this analysis yielded three factors for the scale, which accounted for 77.957 percent of the variation in the data.

The three factors identified as part of this EFA aligned with the theoretical proposition in this research. Factor 1 includes items from 1 to 7 and from 9 to 12, referring to basic skills. Factor 2 is comprised of item 8 and items from 13 to 28, which represent advanced skills. Finally, Factor 3 includes items 29 and 30, referring to specialized skills. Factor Loadings are presented in Table 21.

In accordance with the fourth goal of the research, factor scores were compared in order to determine if there are significant differences between the groups in four categories: gender, level of education, age, and region. Mean values for composite variables representing three identified factors can be seen in Table 22. The basic e-government skills factor had a mean value of 4.5018. The advanced e-government skills factor was 3.9199, and the specialized e-government skills mean was 3.0098.

Differences between the genders for factors can be seen in Table 23. The T-test has detected statistically significant differences among the genders on both basic and advanced e-government skills factors. Female respondents had higher scores on both factors. However, the level of specialized skills is not significantly different between the genders, and the mean score is almost the same, 2.99 compared to 3.02.

Differences between the age groups can be seen in Table 24. ANOVA has detected statistically significant differences among the age groups on all three factors. The Bonferroni post-hoc test analysis (Table 25) for the basic e-government factor shows that there are no significant differences between the first four age groups, i.e., respondents younger than 44 years. Then there is a significant difference between the first four and all other groups, and also all other age groups are significantly different from each other. The younger the respondents are, the better their basic e-government skills. The Bonferroni test for advanced e-government skills factor (Table 26) is similar to the basic skills factor with one difference. This time, the first three age groups are not significantly different, and the 35 to 44 years group is now significantly worse than the first three groups. For the specialized e-government skills (Table 27), the Bonferroni test shows different results, with the youngest group being at the same level as the 45 to 54 group and the age group from 25 to 34 having the best results, followed by the 18 to 24 and 35 to 44 age groups. The oldest 65+ group shows an almost complete lack of these skills.

Differences between the levels of education can be seen in Table 28. ANOVA has detected statistically significant differences among the different levels of education for all three factors. The Bonferroni test for all factors shows significant differences between all levels of education for all factors (Tables 29, 30, and 31). In general, the more educated respondents are, the better their results, and all differences between the groups are statistically significant.

Differences between the regions for factors can be seen in Table 32. ANOVA has detected statistically significant differences among the different regions of the Republic of Serbia on the first two factors and no significant differences on the third factor. For the basic e-government skills factor (Table 33), the Belgrade region is significantly better than all the other regions, and the Vojvodina region is significantly better than the Eastern Serbia region. For the advanced e-government skills factor, the Belgrade region is significantly better than all other regions.

4 Discussion

The first goal of the research was to determine the level of digital skills of the citizens. Thirty questions about the level of digital skills were sufficient to cover all major aspects.

The basic skills group of questions is comprised of the most essential skills. In general, mean values of grades for this group of questions are around 4.5, which seems to be high and means that these skills pose no problems for the majority of the respondents. Also, there are respondents who have problems with this group of skills, and if they are unable to power on a device, how can they even use it? Basic

skills belonging to the powering on a device and using basic input methods group also show interesting relationships between regions. Belgrade respondents have marked their skills the highest in general. Smartphones and tablets are relatively new gadgets, and basic skills for their use are not taught at school; they are acquired by daily use. Belgrade's higher living standards may contribute to people buying new gadgets much earlier than people in other regions.

Operation systems and application use skills pose much greater problems for respondents from all regions, with a mean value of around 4. Unlike previous groups of skills that can be learned just by using the device, many of these skills do require some form of formal training. Parts of the population that did not learn these skills at school had to learn them through some form of informal education. Significant efforts have been made by the government in the last couple of decades to push IT education to lower levels of education. At the turn of the century, these skills were something that was taught at the university level. Later, they were pushed to secondary education and then to the primary education level. Nowadays, new generations start learning basic computer skills in school from the first grade of primary school. The Belgrade region is again significantly better than all other regions. Belgrade's status as the capital city and university center possibly plays a big role in these results.

Questions about Internet use show that basic Internet use skills are not a big problem, with an average score of around 4.5 for the first three questions. The fourth question, about using hyperlinks, menus, and other navigation elements of a website, however, is a different story. With an average score of 3.77, it falls into the group of questions with the worst average score. It shows that although the respondents use the Internet without problems, they still have issues with some more advanced topics. This can hint that the websites they were using have problems in the domain of user interface and user experience.

Communication skills questions mean scores go from 4.66 for communication using a mobile phone to 4.16 for communication via email. The score for the mobile phone is higher than the score for the question about powering on a smartphone. This could mean that there is still a population of people who use classic mobile phones that do not have applications like Viber and Skype. However, communication via VOIP services with a mean score of 4.39 is still a very good result. Email communication with only a 4.16 mean score is a bit of a surprise because email is the de facto standard in professional communication. It was expected to be at least at the same level as other communication methods. This also raises the question whether respondents would prefer using mobile VOIP communication apps for communication with the government.

When it comes to technical problems, respondents have scored their skills very modestly. The mean score of skills is as expected, the lowest for solving problems and the highest for asking for help. However, the mean score for asking for help is not as high as we expected. In the era of constant technological progress, it is normal to come across a technical problem that one is unable to resolve. Nevertheless, it is very problematic when one comes across a problem for which one does not know how to get help. This is especially important in the context of e-government services that can be very specialized.

The next group of questions is the group comprised of the basic e-government skills. Their mean scores are relatively low, with the printing files skill being best with 4.04 and paying for services over the Internet being worst with 3.57. Unlike previous groups that had a common theme, these skills are not the same, so they have to be assessed separately. The first question is about filling out digital forms on the website. This question is much more important than it looks since, for the majority of local government websites in Serbia, filling out online forms is the pinnacle of offered e-government services. A mean of 3.86 is very low for a skill that is practically a prerequisite to effectively use the e-government. The second question in this group is about paying for services over the Internet. Its mean score of 3.57 is the lowest in this group of questions and generally one of the questions where the respondents are the most insecure. This could be a very big problem for the Serbian e-government. If the goal is to replace classic government services with their electronic equivalents, citizens must be able to pay for the service to complete the whole transaction electronically. Furthermore, not only being able to pay but also the user experience of paying for e-government services has to be at least as good as paying the traditional way. The third question in this group was the question about safely using Internet services. The mean for this question is 3.86, which means that a large number of respondents are not secure about their safety when using the Internet. This can also be very problematic for the e-government because of the sensitivity of data shared over the Internet when using e-government services. Unless citizens are 100% sure that these services are secure and safe and that they have the skills to make Internet transactions with e-government safely, there will always be a certain percentage of citizens that are reluctant to use the e-government services. The following four questions are basic office skills. Anyone who has some office experience should be able to download and print files. Also, the same can be said about scanning documents and sending them via an email attachment. Interestingly, the mean score for sending email attachments is 4.00 versus 4.16 for communicating with the email skill.

The specialized e-government skills group is the only group of questions where there are no significant differences among regions. These skills are also the skills that have the lowest mean scores in this survey. With 3.05 for using a digital certificate and 2.97 for digitally signing a document, we can say that these skills are

very problematic for the respondents. This is not a surprise since the average person has no reason to know about using digital certificates except to interact with e-government services, where they are used for authentication and authorization purposes. These results would be even worse if the Serbian tax administration had not started requiring that directors of companies digitally sign final bills at the end of each fiscal year, which forced some citizens to learn more about digital certificates. If the Serbian e-government wants to accomplish the highest levels of e-government services, secure authentication and authorization are necessary. For the e-government to truly replace classic government services, signing digital documents should be as easy as signing paper ones. This is a typical situation where the government invests in cutting-edge e-government technology, but the average citizen has no idea how to use it.

The second goal of the research was to determine if there are significant levels of skills differences between the regions. Results of the ANOVA (Pallant, J.F., 2016) have shown that there are significant differences between the regions. Analysis of variance determined that there are significant differences between the regions for the first six groups of questions. Respondents from the Belgrade region had better results than respondents from all other regions, which was expected; however, the size of that gap between Belgrade and the other regions was not. The Vojvodina region is better than the east and west Serbia regions on some of the questions, but in general, it still performed worse than expected. In conclusion, research identified that there are significant differences, but the reason or reasons for the differences have yet to be determined. For the seventh group, which included questions about digital certificates and their use, the differences among the regions were not statistically significant. These skills are relatively new, and they are not taught in schools, which has contributed to the low levels of these skills in the whole country.

The third goal of the research was to determine common factors for variables that measure the digital skills of citizens. An exploratory factor analysis (Stevens, J.P. 2009) was used to identify three main factors that represented basic, advanced, and specialized skills. These factors were subsequently used to explore the differences between different groups of respondents based on their gender, age, level of education, and region where they live, which was the fourth goal of the research.

The T-Test determined that female respondents have significantly better scores than male respondents on basic and advanced skills. This finding was not expected since many government documents (Bogdanovic-Dinic et al., 2013; Ministry of public administration and local self-government, 2020) state otherwise. However, in this research, female respondents have a higher level of digital skills. The reason for this is not completely clear, so this phenomenon definitely remains unclear and requires more research. There was no statistically significant difference between the genders in specialized skills.

The age group influenced the results much differently for basic skills. Mean scores were in descending order from the youngest to oldest age group. For advanced and specialized skills, mean scores peaked in the "25-34" age group. For all three skill levels, the "65 plus" group scores were the lowest, which indicates that this age group has a huge problem doing anything digitally.

One-way ANOVA determined significant differences between the education levels for all three factors. The higher the education level, the better the scores were. The fact that there are statistically significant differences between all education groups only proves how important education is for e-government.

Differences between the regions are significant for basic and advanced skill groups, while for specialized skills group, the differences were not significant. Differences are most emphasized between the Belgrade region and other regions. The city of Belgrade is a university center and also the capital of the Republic of Serbia. Furthermore, it also has the highest standard of living among the regions (Statistical Office of the Republic of Serbia, 2011). Also, one of the factors that is present in the literature is the difference between urban and rural areas. While other regions have a substantial rural population, Belgrade is a city and therefore has a mostly urban population. Previous research (Seo & Bernsen, 2016) indicates that the urban population is much more computer proficient than the rural population. Also, there is the problem of infrastructure. These could be some of the contributing factors to why Belgrade is better with skills for using e-government services and computer literacy in general. However, this finding also requires additional research, especially because, due to the limitations of the data-gathering strategy, the study was unable to assess the differences between the urban and rural population.

5 Conclusions

In conclusion, the study has fulfilled its exploratory goals and created a solid foundation for further research. In the process, many new research questions were uncovered. Due to limitations in how the data was gathered (the survey used convenience sampling and was sent only to municipalities with over 35,000 inhabitants), the survey results cannot be generalized. The obvious next step in research on this topic would be for the next study/ies to address the generalizability and to check to what extent the results are applicable to the general population. The way the study was conducted could not detect the differences between the urban and rural population. This question remains unanswered and this is obviously something that will have to be addressed in future confirmatory research on this topic. Other newly opened research topics stem from unexpectedly good or bad results obtained in the research. Thus, the significant gap in skill levels between Belgrade and other regions emerges as one of the important topics for further

research especially since this gap is possibly even wider between Belgrade and municipalities smaller than 35,000 inhabitants. The level of digital skills of women, which is higher than that of men, is also one of the unexplored areas that should be further investigated and explained in the future. Recently in Serbia there were many »Women in tech« initiatives that included IT training and it would seem that these initiatives are yielding results. Further study into this phenomenon could give an answer to questions about what the government can do to increase e-government e-skills of vulnerable populations. When speaking about digitally vulnerable populations, the research has also indicated that those over the age of 65 are at risk and face complete digital exclusion if something does not change, making it a highly interesting and significant topic for further research. One of the topics that have arisen due to poor results is the user experience when using e-government services. In addition, there are also topics of digital security, detecting and solving technical issues, and the use of Web 2.0 technologies such as Viber and Skype and possibly other social media in the context of the e-government.

In general, the research has identified large gaps between the needed and current levels of digital skills. The Digital skills of citizens are relatively low compared to the levels needed to use e-government services effectively. Therefore, as already mentioned, further studies into methods of increasing the e-skills of citizens is required. Although factor analysis has divided them into three factors, all skills presented in this research are relatively simple digital skills. A large portion of Serbian citizens has problems even with the simplest digital skills. If all plans from numerous strategies go through, the digital gap will increase even further. The worst situation is with specialized skills for using digital certificates. To become a real replacement for classic government services, e-government services would require documents to be signed, and if citizens do not know how to sign documents electronically, the adoption level of e-government will remain far below the level that the government expects. Therefore, the main conclusion of the analysis is that it would be desirable to create an instrument that could be used for the continuous monitoring of this phenomenon, considering that monitoring and measurement are prerequisites for the continuous improvement of any phenomenon.

References:

Akram, M. S. & Malik, A. (2012) Evaluating citizens' readiness to embrace e-government services, *Proceedings of the 13th Annual International Conference on Digital Government Research* (New York: Association for Computing Machinery), pp. 58-67, https://doi.org/10.1145/2307729.2307740.

Alateyah, S. A., Crowder, R. M. & Wills, G. B. (2013) Identified Factors Affecting the Citizen's Intention to Adopt E-government in Saudi Arabia, *Journal of Information and communication convergence engineering*, 7, pp. 2435–2443.

Alghamdi, I. A., Goodwin, R. & Rampersad, G. C. (2011) E-Government Readiness Assessment for Government Organizations in Developing Countries, *Computer and Information Science*, 4(3), pp. 3-17.

Alguliyev, R. M. & Yusifov, F. (2015) The Effective Mechanisms in Monitoring and Management of E-Government, *Journal of Public Administration and Governance*, 5(2), pp. 55-61, https://doi.org/10.5296/jpag.v5i2.7405.

Alshehri, M. & Drew, S. (2010) Implementation of e-Government: Advantages and Challenges, In: Ferreira, F. (ed.) *Proceedings of the IASK International Conference E-Activity and Leading Technologies & InterTIC 2010*, (Oviedo: International Association for Scientific Knowledge), pp. 79–86.

Angeleski, M., Mitrevski, P., Rocheska, S. & Lashkoska, A. (2014) Regional Pilot Study to Evaluate e-Readiness and Local e-Government Services, *International Journal of Managing Public Sector Information and Communication Technologies*, 5(2), pp. 1-10.

Bawden, D. (2001) Information and digital literacies: a review of concepts, *Journal of Documentation*, 57(2), pp. 218-259.

Bianco, D. & Trutkowski, C. (2017) *Upravljanje ljudskim resursima u lokalnoj samoupravi* (Beograd: Council of Europe), available at: https://rm.coe.int/1680709658 (May 15, 2023).

Bogdanovic-Dinic, S., Veljkovic, N. & Stoimenov, L. (2013) E-Government Development in Serbia: Challenges, Issues, and Opportunities, In: Mahmood, Z. (ed.) *E-Government Implementation and Practice in Developing Countries* (Hershey: IGI Global), pp. 265-290, https://doi.org/10.4018/978-1-4666-4090-0.ch012.

Burlacu, S., Pătărlăgeanu, S. R., Diaconu, A. & Ciobanu, G. (2021) E-government in the Era of Globalization and the Health Crisis Caused by the Covid-19 Pandemic, between Standards and Innovation, *SHS Web of Conferences*, 92, https://doi.org/10.1051/shsconf/20219208004.

Carretero, S., Vuorikari, R. & Punie, Y. (2018) *DigComp 2.1: The digital competence framework for citizens with eight proficiency levels and examples of use* (Luxemburg: Publication Office of the European Union), available at: https://data.europa.eu/doi/10.2760/38842 (May 15, 2023).

CESID (2021) *Percepcija zaposlenih u javnoj upravi o medijskoj i digitalnoj pismenosti (CESID)*, available at: http://www.cesid.rs/wp-content/uploads/2021/06/CeSID-Propulsion-2021-Percepcija-zaposlenih-u-javnoj-upravi-o-medijskoj-i-digitalnoj-pismenosti.pdf (May 15, 2023).

Dukić, D., Dukić, G. & Bertović, N. (2017) Public administration employees' readiness and acceptance of e-government: Findings from a Croatian survey, *Information Development*, 33(5), pp. 525–539, https://doi.org/10.1177/0266666916671773.

Đurašković, J. (2018) Competence of Using the Electronic Government Services in Serbia, *Serbian Journal of Engineering Management*, 3(1), pp. 35-41.

European Commission (2021) *Desi 2021 - Digital Economy and Society Index Report 2021* (Luxemburg: European Commission), available at: https://ec.europa.eu/newsroom/dae/redirection/document/80563 (May 15, 2023).

Foley, P., Sutton, D., Wiseman, I., Green, L. & Moore, J. (2018) *International Digital Economy and Society Index 2018* (Luxemburg: Publication Office of the European Union), https://doi.org/10.2759/745483.

Foley, P., Sutton, D., Potter, R., Pattel, S. & Gemmell, A. (2021) *International Digital Economy and Society Index 2020* (Luxemburg: Publication Office of the European Union), https://doi.org/10.2759/757411.

Friemel, T. N. (2016) The digital divide has grown old: Determinants of a digital divide among seniors, *New Media & Society*, 18(2), pp. 313–331, https://doi.org/10.1177/1461444814538648.

Hodžić, S., Ravšelj, D. & Jurlina Alibegović, D. (2021) E-Government Effectiveness and Efficiency in EU-28 and COVID-19, *Central European Public Administration Review*, 19(1), pp. 159-180, https://doi.org/10.17573/cepar.2021.1.07.

Joseph, S. & Olugbara, O. O. (2018) Evaluation of municipal e-government readiness using structural equation modeling technique, *The Journal for Transdisciplinary Research in Southern Africa*, 14(1), p. 10, https://doi.org/10.4102/td.v14i1.356.

Jukic, T., Kunstelj, M., Decman, M. & Vintar, M. (2014) Civil Servants' View of the Development of e-Government in Slovenia, *International Public Administration Review*, 6(4), https://doi.org/10.17573/cepar.v6i4.115.

Khaemba, S. N., Muketha, G. M. & Matoke, N. (2017) Factors affecting citizen readiness for e-government systems in Kenya, *Journal of Research in Engineering and Applied Sciences*, 2(2), pp. 59-67, https://doi.org/10.46565/jreas.2017.v02i02.003.

Khan, M. A., Khurram, S. & Zubair, D. (2020) Societal E-Readiness for E-Governance Adaptability in Pakistan, *Pakistan Journal of Commerce and Social Sciences*, 14(1), pp. 273-299.

Khan, G., Moon, J., Rhee, C. & Rho, J. (2010) E-government Skills Identification and Development: Toward a Staged-Based User-Centric Approach for Developing Countries, *Asia pacific journal of information systems*, 20, pp. 1-31.

Krejcie, R. V. & Morgan, D. W. (1970) Determining Sample Size for Research Activities, *Educational and Psychological Measurement*, 30(3), pp. 607–610, https://doi.org/10.1177/001316447003000308.

Kuzmanović, D., Pavlović, Z., Popadić, D. & Milošević, T. (2019) *Korišćenje interneta i digitalne tehnologije kod dece i mladih u Srbiji: rezultati istraživanja Deca Evrope na internetu* (Beograd: Institut za psihologiju Filozofskog fakulteta), available at: https://www.unicef.org/serbia/media/12511/file/koriscenje_interneta_i_digitalne_tehnologije_kod_dece_i_mladih_u_Srbiji.pdf (May 15, 2023).

Ministry of Trade, telecommunications and tourism (2020) Strategy for Digital Skills Development in the Republic of Serbia 2020-2024 (2020), *Official Gazette of the Republic of Serbia*, 21/2020.

Ministry of public administration and local self-government (2020) *E-Government Development Programme of the Republic of Serbia 2020−2022 and Action Plan for its implementation*, available at: http://mduls.gov.rs/wp-content/uploads/e-Government-Development-Programme-2020-2022-FINAL-2.pdf (May 15, 2023).

Mensah, I. K. (2018) Citizens' Readiness to Adopt and Use E-government Services in the City of Harbin, China, *International Journal of Public Administration*, 41, pp. 297–307.

Minović, M., Milovanović, M., Stavljanin, V., Draskovic, B. & Lazic, D. (2014) Semantic technologies on the mission: Preventing corruption in public procurement, *Computers in Industry*, 65(5), pp. 878-890, https://doi.org/10.1016/j.compind.2014.02.003.

Pallant, J. F. (2016) *SPSS Survival Manual* (Maidenhead: McGraw-Hill Education).

Pangrazio, L., Godhe, A. & Ledesma, A. G. (2020) What is digital literacy? A comparative review of publications across three language contexts, *E-Learning and Digital Media*, 17(6), pp. 442–459.

Reddick, C. G. (2005) Citizen interaction with e-government: From the streets to servers?, *Government Information Quarterly*, 22(1), pp. 38-57, https://doi.org/10.1016/j.giq.2004.10.003.

Saptono, P. B., Hodžić, S., Khozen, I., Mahmud, G., Pratiwi, I., Purwanto, D., Aditama, M. A., Haq, N. & Khodijah, S. (2023) Quality of E-Tax System and Tax Compliance Intention: The Mediating Role of User Satisfaction, *Informatics*, 10(1), p. 22, https://doi.org/10.3390/informatics10010022.

Shao, D., Mwangakala, H. A., Ishengoma, F. R., Mongi, H., Mambile, C. & Chali, F. (2022) Sustenance of the digital transformations induced by the COVID-19 pandemic response: lessons from Tanzanian public sector, *Global Knowledge, Memory and Communication*, https://doi.org/10.1108/GKMC-11-2021-0186.

Seo, D. & Bernsen, M. (2016) Comparing attitudes toward e-government of non-users versus users in a rural and urban municipality, *Government Information Quarterly*, 33(2), pp. 270-282, https://doi.org/10.1016/j.giq.2016.02.002.

Šereš, L. & Horvat, I. (2011) *eGovernment in Serbia: Prospects and challenges*, available at: https://www.researchgate.net/profile/Laslo-Seres/publication/290981830_eGovernment_in_Serbia_Prospects_and_challenges/links/5c10efaa92851c39ebe700ca/eGovernment-in-Serbia-Prospects-and-challenges.pdf (May 15, 2023).

Statistical Office of the Republic of Serbia (2011) *Census 2011*, available at: https://www.stat.gov.rs/en-US/oblasti/popis/popis-2011 (May 15, 2023).

Stevens, J. P. (2009) *Applied multivariate statistics for the social sciences*, 5th ed. (New York: Routledge).

Teodorović, N., Vračević, M., Bašić, G., Miljković, N., Matijević, B. (2019) *Starenje i digitalna uključenost: polazna studija sa preporukama* (Beograd: Crveni krst Srbije, Institut društvenih nauka), available at: https://www.redcross.org.rs/media/6183/starenje-i-digitalna-ukljucenost-web.pdf (May 15, 2023).

The law on Ministries (2007) *Official Gazette of the Republic of Serbia*, 43/2007.

The law on Ministries (2011) *Official Gazette of the Republic of Serbia*, 16/2011.

The law on Ministries (2014) *Official Gazette of the Republic of Serbia*, 44/2014.

UK Department for Education (2019) *National standards for essential digital skills 2019* (London: Department for Education Great Britain), available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/909932/National_standards_for_essential_digital_skills.pdf (May 15, 2023).

United Nations (2018) *E-government Survey 2018: Gearing e-government to support transformation towards sustainable and resilient societies*, available at: https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2018-Survey/E-Government%20Survey%202018_FINAL%20for%20web.pdf (May 15, 2023).

United Nations (2020) *E-Government Survey 2020: Digital government in the Decade of Action for Sustainable Development: with an addendum on COVID-19 Response*, available at: https://digitallibrary.un.org/record/3884686/files/2020_UN_E-Government_Survey_%28Full_Report%29.pdf (May 15, 2023).

United Nations (2022) *E-Government Survey 2022: The Future of Digital Government*, available at: https://desapublications.un.org/sites/default/files/publications/2022-09/Web%20version%20EGovernment%202022.pdf (May 15, 2023).

Vidojevic, D. (Accepted for publishing, 2020) Fifteen Years of E-Government in Serbia, In: Pantović, V., Starčević, D. & Milovanović, D. (eds.) *Infotech 2020, 2021 & 2022 Selected Papers* (Beograd: ASIT), pp. 3-7.

Wurzburger, S., Zlatanovic, I., Simonović, A., Popović, V., Lazić, K. & Pantović, V. (2023) Continual education of internal auditors in the field of information technology, In: Dumnić,

B. (ed.) *Zbornik radova XXIX skup Trendovi razvoja Univerzitet pred novim izazovima Trend 2023* (Novi Sad: Fakultet tehničkih nauka), pp. 156-161.

Appendix:

Table 1: Demographic characteristics of participants

Characteristics	n	%
Gender		
Male	1,311	45.3
Female	1,583	54.7
Level of education		
Primary school or less	181	6.3
High school	1,131	39.1
College	456	15.8
University	1,126	38.9
Age		
Below 18	142	4.9
18 to 24	270	9.3
25 to 34	535	18.5
35 to 44	706	24.4
45 to 54	556	19.2
55 to 64	524	18.1
65 and above	161	5.6

Table 2: Descriptive statistics for "The basic skills group"

	Mean	Median	Mode	Std. Deviation
1. I know how to power on a computer	4.62	5.00	5	.958
2. I know how to power on a smart phone	4.59	5.00	5	.980
3. I know how to power on a tablet	4.46	5.00	5	1.150
4. I know how to use mouse and keyboard	4.60	5.00	5	.986
5. I know how to use touchscreen	4.48	5.00	5	1.104

Table 3: Descriptive statistics for the "Operative systems group"

	Mean	Median	Mode	Std. Deviation
6. I know how to use and set accessibility tools	4.34	5.00	5	1.196
8. I know how to install and run applications	4.14	5.00	5	1.310
15. I know how to open, read and save data in files	4.05	5.00	5	1.371
16. I know how to work with files and folders	3.93	5.00	5	1.404
20. I know how to use applications to enter, edit and format data	3.78	4.00	5	1.406
21. I know how to capture and reproduce images, sound, and video	4.01	5.00	5	1.351

Table 4: Descriptive statistics for the "Internet skills" group

	Mean	Median	Mode	Std. Deviation
7. I know how to connect to the Internet	4.47	5.00	5	1.094
9. I know how to use Internet browser	4.44	5.00	5	1.103
10. I know how to find information on the Internet using search an engine	4.47	5.00	5	1.067
14. I know how to use hyper-links, menus and other navigation elements of a website	3.77	4.00	5	1.458

Table 5: Descriptive statistics for the "Communication skills" group

	Mean	Median	Mode	Std. Deviation
11. I know how to communicate with others via mobile phone	4.66	5.00	5	.857
12. I know how to communicate with others via VOIP services (Skype, Viber)	4.39	5.00	5	1.140
13. I know how to communicate with others using e-mail	4.16	5.00	5	1.327

Table 6: Descriptive statistics for the "Technical issue skills" group

	Mean	Median	Mode	Std. Deviation
17. I know how to recognize when there is a technical problem with the device that I am using	3.88	4.00	5	1.328
18. I know how to solve simple technical problems with the device that I am using	3.74	4.00	5	1.379
19. I know how to ask for help when I come across a technical issue that I can't solve by myself	4.08	5.00	5	1.247

Table 7: Descriptive statistics for the "Technical issue skills" group

	Mean	Median	Mode	Std. Deviation
22. I know how to fill out a digital form on the website	3.86	5.00	5	1.457
23. I know how to pay for services over the Internet	3.57	4.00	5	1.619
24. I know how to use digital devices and Internet services safely	3.86	4.00	5	1.393
25. I know how to download file from the Internet website and save it on my device	3.88	5.00	5	1.464
26. I know how to print a file that I have on my computer	4.04	5.00	5	1.400
27. I know how to scan a document and save it on the computer	3.90	5.00	5	1.473
28. I know how to send electronic document via e-mail	4.00	5.00	5	1.437

Table 8: Descriptive statistics for the "Specialized e-government skills" group

	Mean	Median	Mode	Std. Deviation
29. I know how to use digital certificate	3.05	3.00	1	1.696
30. I know how to electronically sign a document	2.97	3.00	1	1.725

Table 9: One–way ANOVA for the basic skills group

Statement	F	P
"I know how to…"		
power on a computer.	21.787	<0.001
power on a smartphone.	21.551	<0.001
power on a tablet.	11.986	<0.001
use mouse and keyboard.	13.919	<0.001
use touchscreen.	16.007	<0.001

Table 10: Bonferroni Post-Hoc comparison between the regions for the basic skills group

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
1. I know how to power on a computer	Belgrade	Vojvodina	-.033	.049	1.000	-.16	.10
		Eastern Serbia	.313*	.048	.000	.19	.44
		Western Serbia	.186*	.050	.001	.05	.32
	Vojvodina	Belgrade	.033	.049	1.000	-.10	.16
		Eastern Serbia	.346*	.050	.000	.21	.48
		Western Serbia	.219*	.052	.000	.08	.36
	Eastern Serbia	Belgrade	-.313*	.048	.000	-.44	-.19
		Vojvodina	-.346*	.050	.000	-.48	-.21
		Western Serbia	-.127	.051	.073	-.26	.01
	Western Serbia	Belgrade	-.186*	.050	.001	-.32	-.05
		Vojvodina	-.219*	.052	.000	-.36	-.08
		Eastern Serbia	.127	.051	.073	-.01	.26
2. I know how to power on a smart phone	Belgrade	Vojvodina	.145*	.050	.025	.01	.28
		Eastern Serbia	.372*	.049	.000	.24	.50
		Western Serbia	.276*	.051	.000	.14	.41
	Vojvodina	Belgrade	-.145*	.050	.025	-.28	-.01
		Eastern Serbia	.227*	.051	.000	.09	.36

		Western Serbia	.131	.053	.084	-.01	.27
	Eastern Serbia	Belgrade	-.372*	.049	.000	-.50	-.24
		Vojvodina	-.227*	.051	.000	-.36	-.09
		Western Serbia	-.096	.052	.391	-.23	.04
	Western Serbia	Belgrade	-.276*	.051	.000	-.41	-.14
		Vojvodina	-.131	.053	.084	-.27	.01
		Eastern Serbia	.096	.052	.391	-.04	.23
3. I know how to power on a tablet	Belgrade	Vojvodina	.190*	.060	.009	.03	.35
		Eastern Serbia	.317*	.058	.000	.16	.47
		Western Serbia	.281*	.060	.000	.12	.44
	Vojvodina	Belgrade	-.190*	.060	.009	-.35	-.03
		Eastern Serbia	.127	.061	.213	-.03	.29
		Western Serbia	.091	.063	.898	-.08	.26
	Eastern Serbia	Belgrade	-.317*	.058	.000	-.47	-.16
		Vojvodina	-.127	.061	.213	-.29	.03
		Western Serbia	-.037	.061	1.000	-.20	.13
	Western Serbia	Belgrade	-.281*	.060	.000	-.44	-.12
		Vojvodina	-.091	.063	.898	-.26	.08
		Eastern Serbia	.037	.061	1.000	-.13	.20
4. I know how to use mouse and keyboard	Belgrade	Vojvodina	-.011	.051	1.000	-.15	.12
		Eastern Serbia	.250*	.049	.000	.12	.38
		Western Serbia	.203*	.052	.001	.07	.34
	Vojvodina	Belgrade	.011	.051	1.000	-.12	.15
		Eastern Serbia	.260*	.052	.000	.12	.40
		Western Serbia	.213*	.054	.000	.07	.36
	Eastern Serbia	Belgrade	-.250*	.049	.000	-.38	-.12
		Vojvodina	-.260*	.052	.000	-.40	-.12
		Western Serbia	-.047	.052	1.000	-.19	.09
	Western Serbia	Belgrade	-.203*	.052	.001	-.34	-.07
		Vojvodina	-.213*	.054	.000	-.36	-.07

		Eastern Serbia	.047	.052	1.000	-.09	.19
5. I know how to use touchscreen	Belgrade	Vojvodina	.221*	.057	.001	.07	.37
		Eastern Serbia	.363*	.055	.000	.22	.51
		Western Serbia	.286*	.058	.000	.13	.44
	Vojvodina	Belgrade	-.221*	.057	.001	-.37	-.07
		Eastern Serbia	.143	.058	.084	-.01	.30
		Western Serbia	.066	.060	1.000	-.09	.23
	Eastern Serbia	Belgrade	-.363*	.055	.000	-.51	-.22
		Vojvodina	-.143	.058	.084	-.30	.01
		Western Serbia	-.077	.059	1.000	-.23	.08
	Western Serbia	Belgrade	-.286*	.058	.000	-.44	-.13
		Vojvodina	-.066	.060	1.000	-.23	.09
		Eastern Serbia	.077	.059	1.000	-.08	.23

*. The mean difference is significant at the 0.05 level.

Table 11: One-way ANOVA for the operating systems skills

Statement	F	P
"I know how to…"		
use and set accessibility tools.	8.59	<0.001
install and run applications.	10.545	<0.001
open, read and save data in files.	9.787	<0.001
work with files and folders.	9.423	<0.001
use applications to enter, edit and format data.	6.164	<0.001
capture and reproduce images, sound and video.	25.341	<0.001

Table 12: Bonferroni Post-Hoc comparison between the regions for the basic skills group

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
6. I know how to use and set accessibility tools	Belgrade	Vojvodina	.143	.062	.130	-.02	.31
		Eastern Serbia	.298*	.060	.000	.14	.46
		Western Serbia	.202*	.063	.008	.04	.37
	Vojvodina	Belgrade	-.143	.062	.130	-.31	.02
		Eastern Serbia	.155	.063	.085	-.01	.32
		Western Serbia	.059	.066	1.000	-.11	.23
	Eastern Serbia	Belgrade	-.298*	.060	.000	-.46	-.14
		Vojvodina	-.155	.063	.085	-.32	.01
		Western Serbia	-.096	.064	.805	-.26	.07
	Western Serbia	Belgrade	-.202*	.063	.008	-.37	-.04
		Vojvodina	-.059	.066	1.000	-.23	.11
		Eastern Serbia	.096	.064	.805	-.07	.26
8. I know how to install and run applications	Belgrade	Vojvodina	.280*	.068	.000	.10	.46
		Eastern Serbia	.345*	.066	.000	.17	.52
		Western Serbia	.239*	.069	.003	.06	.42
	Vojvodina	Belgrade	-.280*	.068	.000	-.46	-.10
		Eastern Serbia	.065	.069	1.000	-.12	.25
		Western Serbia	-.042	.072	1.000	-.23	.15
	Eastern Serbia	Belgrade	-.345*	.066	.000	-.52	-.17
		Vojvodina	-.065	.069	1.000	-.25	.12
		Western Serbia	-.107	.070	.759	-.29	.08
	Western Serbia	Belgrade	-.239*	.069	.003	-.42	-.06
		Vojvodina	.042	.072	1.000	-.15	.23
		Eastern Serbia	.107	.070	.759	-.08	.29
15. I know how to open, read	Belgrade	Vojvodina	.259*	.071	.002	.07	.45
		Eastern Serbia	.315*	.069	.000	.13	.50

and save data in files		Western Serbia	.327*	.072	.000	.14	.52
	Vojvodina	Belgrade	-.259*	.071	.002	-.45	-.07
		Eastern Serbia	.056	.072	1.000	-.14	.25
		Western Serbia	.068	.075	1.000	-.13	.27
	Eastern Serbia	Belgrade	-.315*	.069	.000	-.50	-.13
		Vojvodina	-.056	.072	1.000	-.25	.14
		Western Serbia	.012	.073	1.000	-.18	.21
	Western Serbia	Belgrade	-.327*	.072	.000	-.52	-.14
		Vojvodina	-.068	.075	1.000	-.27	.13
		Eastern Serbia	-.012	.073	1.000	-.21	.18
16. I know how to work with files and folders	Belgrade	Vojvodina	.269*	.073	.001	.08	.46
		Eastern Serbia	.323*	.070	.000	.14	.51
		Western Serbia	.317*	.074	.000	.12	.51
	Vojvodina	Belgrade	-.269*	.073	.001	-.46	-.08
		Eastern Serbia	.054	.074	1.000	-.14	.25
		Western Serbia	.048	.077	1.000	-.16	.25
	Eastern Serbia	Belgrade	-.323*	.070	.000	-.51	-.14
		Vojvodina	-.054	.074	1.000	-.25	.14
		Western Serbia	-.006	.075	1.000	-.20	.19
	Western Serbia	Belgrade	-.317*	.074	.000	-.51	-.12
		Vojvodina	-.048	.077	1.000	-.25	.16
		Eastern Serbia	.006	.075	1.000	-.19	.20
20. I know how to use applications to enter, edit and format data	Belgrade	Vojvodina	.176	.073	.098	-.02	.37
		Eastern Serbia	.277*	.071	.001	.09	.46
		Western Serbia	.249*	.074	.005	.05	.44
	Vojvodina	Belgrade	-.176	.073	.098	-.37	.02
		Eastern Serbia	.102	.074	1.000	-.09	.30
		Western Serbia	.073	.077	1.000	-.13	.28
	Eastern Serbia	Belgrade	-.277*	.071	.001	-.46	-.09
		Vojvodina	-.102	.074	1.000	-.30	.09
		Western Serbia	-.029	.075	1.000	-.23	.17

	Western Serbia	Belgrade	-.249*	.074	.005	-.44	-.05
		Vojvodina	-.073	.077	1.000	-.28	.13
		Eastern Serbia	.029	.075	1.000	-.17	.23
21. I know how to capture and reproduce images, sound, and video	Belgrade	Vojvodina	.470*	.069	.000	.29	.65
		Eastern Serbia	.504*	.067	.000	.33	.68
		Western Serbia	.459*	.070	.000	.27	.64
	Vojvodina	Belgrade	-.470*	.069	.000	-.65	-.29
		Eastern Serbia	.034	.071	1.000	-.15	.22
		Western Serbia	-.011	.074	1.000	-.20	.18
	Eastern Serbia	Belgrade	-.504*	.067	.000	-.68	-.33
		Vojvodina	-.034	.071	1.000	-.22	.15
		Western Serbia	-.045	.071	1.000	-.23	.14
	Western Serbia	Belgrade	-.459*	.070	.000	-.64	-.27
		Vojvodina	.011	.074	1.000	-.18	.20
		Eastern Serbia	.045	.071	1.000	-.14	.23

*. The mean difference is significant at the 0.05 level.

Table 13: One-way ANOVA for the operating systems skills

Statement	F	P
"I know how to…"		
connect to the Internet.	13.238	<0.001
use an Internet browser.	11.855	<0.001
find information on the Internet by using a search engine.	12.113	<0.001
use hyperlinks, menus and other navigation elements of a website.	13.919	<0.001

Table 14: Bonferroni Post-Hoc comparison between the regions for the basic skills group

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
7. I know how to connect to the Internet	Belgrade	Vojvodina	.139	.057	.083	-.01	.29
		Eastern Serbia	.324*	.055	.000	.18	.47
		Western Serbia	.255*	.057	.000	.10	.41
	Vojvodina	Belgrade	-.139	.057	.083	-.29	.01
		Eastern Serbia	.185*	.058	.008	.03	.34
		Western Serbia	.115	.060	.324	-.04	.27
	Eastern Serbia	Belgrade	-.324*	.055	.000	-.47	-.18
		Vojvodina	-.185*	.058	.008	-.34	-.03
		Western Serbia	-.069	.058	1.000	-.22	.08
	Western Serbia	Belgrade	-.255*	.057	.000	-.41	-.10
		Vojvodina	-.115	.060	.324	-.27	.04
		Eastern Serbia	.069	.058	1.000	-.08	.22
9. I know how to use Internet browser	Belgrade	Vojvodina	.160*	.057	.031	.01	.31
		Eastern Serbia	.320*	.055	.000	.17	.47
		Western Serbia	.226*	.058	.001	.07	.38
	Vojvodina	Belgrade	-.160*	.057	.031	-.31	-.01
		Eastern Serbia	.160*	.058	.035	.01	.31
		Western Serbia	.066	.060	1.000	-.09	.23
	Eastern Serbia	Belgrade	-.320*	.055	.000	-.47	-.17
		Vojvodina	-.160*	.058	.035	-.31	-.01
		Western Serbia	-.094	.059	.660	-.25	.06
	Western Serbia	Belgrade	-.226*	.058	.001	-.38	-.07
		Vojvodina	-.066	.060	1.000	-.23	.09
		Eastern Serbia	.094	.059	.660	-.06	.25
	Belgrade	Vojvodina	.142	.055	.061	.00	.29

		Eastern Serbia	.315*	.053	.000	.17	.46
		Western Serbia	.207*	.056	.001	.06	.35
	Vojvodina	Belgrade	-.142	.055	.061	-.29	.00
10. I know how to find information on the Internet using search an engine		Eastern Serbia	.173*	.056	.012	.03	.32
		Western Serbia	.065	.058	1.000	-.09	.22
	Eastern Serbia	Belgrade	-.315*	.053	.000	-.46	-.17
		Vojvodina	-.173*	.056	.012	-.32	-.03
		Western Serbia	-.109	.057	.332	-.26	.04
	Western Serbia	Belgrade	-.207*	.056	.001	-.35	-.06
		Vojvodina	-.065	.058	1.000	-.22	.09
		Eastern Serbia	.109	.057	.332	-.04	.26
14. I know how to use hyper-links, menus and other navigation elements of a website	Belgrade	Vojvodina	.379*	.075	.000	.18	.58
		Eastern Serbia	.406*	.073	.000	.21	.60
		Western Serbia	.463*	.076	.000	.26	.66
	Vojvodina	Belgrade	-.379*	.075	.000	-.58	-.18
		Eastern Serbia	.027	.077	1.000	-.17	.23
		Western Serbia	.084	.080	1.000	-.13	.29
	Eastern Serbia	Belgrade	-.406*	.073	.000	-.60	-.21
		Vojvodina	-.027	.077	1.000	-.23	.17
		Western Serbia	.057	.077	1.000	-.15	.26
	Western Serbia	Belgrade	-.463*	.076	.000	-.66	-.26
		Vojvodina	-.084	.080	1.000	-.29	.13
		Eastern Serbia	-.057	.077	1.000	-.26	.15

*. The mean difference is significant at the 0.05 level.

Table 15: One-way ANOVA for the operating systems skills

Statement	F	P
"I know how to…"		
communicate with others via mobile phone.	18.859	<0.001
communicate with others via VOIP services (Skype, Viber).	19.188	<0.001
communicate with others using e-mail.	13.913	<0.001

Table 16: Bonferroni Post-Hoc comparison between the regions for the basic skills group

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
11. I know how to communicate with others via mobile phone	Belgrade	Vojvodina	.093	.044	.212	-.02	.21
		Eastern Serbia	.314*	.043	.000	.20	.43
		Western Serbia	.161*	.045	.002	.04	.28
	Vojvodina	Belgrade	-.093	.044	.212	-.21	.02
		Eastern Serbia	.221*	.045	.000	.10	.34
		Western Serbia	.068	.047	.877	-.06	.19
	Eastern Serbia	Belgrade	-.314*	.043	.000	-.43	-.20
		Vojvodina	-.221*	.045	.000	-.34	-.10
		Western Serbia	-.153*	.045	.005	-.27	-.03
	Western Serbia	Belgrade	-.161*	.045	.002	-.28	-.04
		Vojvodina	-.068	.047	.877	-.19	.06
		Eastern Serbia	.153*	.045	.005	.03	.27
12. I know how to communicate with others via VOIP services	Belgrade	Vojvodina	.258*	.059	.000	.10	.41
		Eastern Serbia	.420*	.057	.000	.27	.57
		Western Serbia	.290*	.060	.000	.13	.45
	Vojvodina	Belgrade	-.258*	.059	.000	-.41	-.10

(Skype, Viber)		Eastern Serbia	.162*	.060	.040	.00	.32
		Western Serbia	.033	.062	1.000	-.13	.20
	Eastern Serbia	Belgrade	-.420*	.057	.000	-.57	-.27
		Vojvodina	-.162*	.060	.040	-.32	.00
		Western Serbia	-.130	.060	.193	-.29	.03
	Western Serbia	Belgrade	-.290*	.060	.000	-.45	-.13
		Vojvodina	-.033	.062	1.000	-.20	.13
		Eastern Serbia	.130	.060	.193	-.03	.29
13. I know how to communicate with others using e-mail	Belgrade	Vojvodina	.150	.069	.176	-.03	.33
		Eastern Serbia	.365*	.066	.000	.19	.54
		Western Serbia	.367*	.069	.000	.18	.55
	Vojvodina	Belgrade	-.150	.069	.176	-.33	.03
		Eastern Serbia	.215*	.070	.012	.03	.40
		Western Serbia	.217*	.073	.017	.03	.41
	Eastern Serbia	Belgrade	-.365*	.066	.000	-.54	-.19
		Vojvodina	-.215*	.070	.012	-.40	-.03
		Western Serbia	.002	.071	1.000	-.18	.19
	Western Serbia	Belgrade	-.367*	.069	.000	-.55	-.18
		Vojvodina	-.217*	.073	.017	-.41	-.03
		Eastern Serbia	-.002	.071	1.000	-.19	.18

*. The mean difference is significant at the 0.05 level.

Table 17: One-way ANOVA for the operating systems skills

Statement	F	P
"I know how to…"		
recognize when there is a technical problem with the device that I am using	9.878	<0.001
solve simple technical problems with the device that I am using	7.829	<0.001
ask for help when I come across a technical issue that I can't solve by myself	13.735	<0.001

Table 18: Bonferroni Post-Hoc comparison between the regions for the basic skills group

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
17. I know how to recognize when there is a technical problem with the device that I am using	Belgrade	Vojvodina	.247*	.069	.002	.07	.43
		Eastern Serbia	.250*	.067	.001	.07	.43
		Western Serbia	.356*	.070	.000	.17	.54
	Vojvodina	Belgrade	-.247*	.069	.002	-.43	-.07
		Eastern Serbia	.003	.070	1.000	-.18	.19
		Western Serbia	.109	.073	.804	-.08	.30
	Eastern Serbia	Belgrade	-.250*	.067	.001	-.43	-.07
		Vojvodina	-.003	.070	1.000	-.19	.18
		Western Serbia	.106	.071	.805	-.08	.29
	Western Serbia	Belgrade	-.356*	.070	.000	-.54	-.17
		Vojvodina	-.109	.073	.804	-.30	.08
		Eastern Serbia	-.106	.071	.805	-.29	.08
18. I know how to solve simple technical	Belgrade	Vojvodina	.206*	.072	.024	.02	.40
		Eastern Serbia	.267*	.069	.001	.08	.45
		Western Serbia	.316*	.072	.000	.12	.51

problems with the device that I am using	Vojvodina	Belgrade	-.206*	.072	.024	-.40	-.02
		Eastern Serbia	.060	.073	1.000	-.13	.25
		Western Serbia	.109	.076	.892	-.09	.31
	Eastern Serbia	Belgrade	-.267*	.069	.001	-.45	-.08
		Vojvodina	-.060	.073	1.000	-.25	.13
		Western Serbia	.049	.074	1.000	-.15	.24
	Western Serbia	Belgrade	-.316*	.072	.000	-.51	-.12
		Vojvodina	-.109	.076	.892	-.31	.09
		Eastern Serbia	-.049	.074	1.000	-.24	.15
19. I know how to ask for help when I come across a technical issue that I can't solve by myself	Belgrade	Vojvodina	.198*	.065	.013	.03	.37
		Eastern Serbia	.347*	.062	.000	.18	.51
		Western Serbia	.352*	.065	.000	.18	.52
	Vojvodina	Belgrade	-.198*	.065	.013	-.37	-.03
		Eastern Serbia	.149	.066	.140	-.02	.32
		Western Serbia	.154	.068	.144	-.03	.33
	Eastern Serbia	Belgrade	-.347*	.062	.000	-.51	-.18
		Vojvodina	-.149	.066	.140	-.32	.02
		Western Serbia	.005	.066	1.000	-.17	.18
	Western Serbia	Belgrade	-.352*	.065	.000	-.52	-.18
		Vojvodina	-.154	.068	.144	-.33	.03
		Eastern Serbia	-.005	.066	1.000	-.18	.17

*. The mean difference is significant at the 0.05 level.

Table 19: One-way ANOVA for the operating systems skills

Statement	F	P
"I know how to…"		
fill out a digital form on the website	18.107	<0.001
pay for services over the Internet	11.961	<0.001
use digital devices and Internet services safely	13.27	<0.001
download files from the Internet website and save them on my device	16.821	<0.001
print a file that I have on my computer	8.727	<0.001
scan a document and save it on the computer	6.819	<0.001
send an electronic document via e-mail	11.638	<0.001

Table 20: Bonferroni Post-Hoc comparison between the regions for the basic skills group

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
22. I know how to fill out a digital form on the website	Belgrade	Vojvodina	.394*	.075	.000	.20	.59
		Eastern Serbia	.436*	.073	.000	.24	.63
		Western Serbia	.478*	.076	.000	.28	.68
	Vojvodina	Belgrade	-.394*	.075	.000	-.59	-.20
		Eastern Serbia	.042	.076	1.000	-.16	.24
		Western Serbia	.084	.080	1.000	-.13	.29
	Eastern Serbia	Belgrade	-.436*	.073	.000	-.63	-.24
		Vojvodina	-.042	.076	1.000	-.24	.16
		Western Serbia	.042	.077	1.000	-.16	.25
	Western Serbia	Belgrade	-.478*	.076	.000	-.68	-.28
		Vojvodina	-.084	.080	1.000	-.29	.13
		Eastern Serbia	-.042	.077	1.000	-.25	.16
23. I know how to pay for services over the Internet	Belgrade	Vojvodina	.304*	.084	.002	.08	.53
		Eastern Serbia	.387*	.081	.000	.17	.60
		Western Serbia	.456*	.085	.000	.23	.68
	Vojvodina	Belgrade	-.304*	.084	.002	-.53	-.08

		Eastern Serbia	.083	.085	1.000	-.14	.31
		Western Serbia	.153	.089	.515	-.08	.39
	Eastern Serbia	Belgrade	-.387*	.081	.000	-.60	-.17
		Vojvodina	-.083	.085	1.000	-.31	.14
		Western Serbia	.069	.086	1.000	-.16	.30
	Western Serbia	Belgrade	-.456*	.085	.000	-.68	-.23
		Vojvodina	-.153	.089	.515	-.39	.08
		Eastern Serbia	-.069	.086	1.000	-.30	.16
24. I know how to use digital devices and Internet services safely	Belgrade	Vojvodina	.322*	.072	.000	.13	.51
		Eastern Serbia	.369*	.070	.000	.18	.55
		Western Serbia	.382*	.073	.000	.19	.57
	Vojvodina	Belgrade	-.322*	.072	.000	-.51	-.13
		Eastern Serbia	.047	.073	1.000	-.15	.24
		Western Serbia	.060	.076	1.000	-.14	.26
	Eastern Serbia	Belgrade	-.369*	.070	.000	-.55	-.18
		Vojvodina	-.047	.073	1.000	-.24	.15
		Western Serbia	.013	.074	1.000	-.18	.21
	Western Serbia	Belgrade	-.382*	.073	.000	-.57	-.19
		Vojvodina	-.060	.076	1.000	-.26	.14
		Eastern Serbia	-.013	.074	1.000	-.21	.18
25. I know how to download file from the Internet website and save it on my device	Belgrade	Vojvodina	.362*	.076	.000	.16	.56
		Eastern Serbia	.426*	.073	.000	.23	.62
		Western Serbia	.469*	.076	.000	.27	.67
	Vojvodina	Belgrade	-.362*	.076	.000	-.56	-.16
		Eastern Serbia	.064	.077	1.000	-.14	.27
		Western Serbia	.107	.080	1.000	-.10	.32
	Eastern Serbia	Belgrade	-.426*	.073	.000	-.62	-.23
		Vojvodina	-.064	.077	1.000	-.27	.14
		Western Serbia	.043	.078	1.000	-.16	.25
	Western Serbia	Belgrade	-.469*	.076	.000	-.67	-.27
		Vojvodina	-.107	.080	1.000	-.32	.10

		Eastern Serbia	-.043	.078	1.000	-.25	.16
26. I know how to print a file that I have on my computer	Belgrade	Vojvodina	.177	.073	.088	-.01	.37
		Eastern Serbia	.277*	.070	.001	.09	.46
		Western Serbia	.346*	.073	.000	.15	.54
	Vojvodina	Belgrade	-.177	.073	.088	-.37	.01
		Eastern Serbia	.099	.074	1.000	-.10	.29
		Western Serbia	.168	.077	.171	-.03	.37
	Eastern Serbia	Belgrade	-.277*	.070	.001	-.46	-.09
		Vojvodina	-.099	.074	1.000	-.29	.10
		Western Serbia	.069	.075	1.000	-.13	.27
	Western Serbia	Belgrade	-.346*	.073	.000	-.54	-.15
		Vojvodina	-.168	.077	.171	-.37	.03
		Eastern Serbia	-.069	.075	1.000	-.27	.13
27. I know how to scan a document and save it on the computer	Belgrade	Vojvodina	.142	.077	.382	-.06	.34
		Eastern Serbia	.298*	.074	.000	.10	.49
		Western Serbia	.278*	.077	.002	.07	.48
	Vojvodina	Belgrade	-.142	.077	.382	-.34	.06
		Eastern Serbia	.156	.078	.267	-.05	.36
		Western Serbia	.136	.081	.556	-.08	.35
	Eastern Serbia	Belgrade	-.298*	.074	.000	-.49	-.10
		Vojvodina	-.156	.078	.267	-.36	.05
		Western Serbia	-.020	.079	1.000	-.23	.19
	Western Serbia	Belgrade	-.278*	.077	.002	-.48	-.07
		Vojvodina	-.136	.081	.556	-.35	.08
		Eastern Serbia	.020	.079	1.000	-.19	.23
28. I know how to send electronic document via e-mail	Belgrade	Vojvodina	.164	.074	.169	-.03	.36
		Eastern Serbia	.376*	.072	.000	.19	.57
		Western Serbia	.352*	.075	.000	.15	.55
	Vojvodina	Belgrade	-.164	.074	.169	-.36	.03
		Eastern Serbia	.212*	.076	.030	.01	.41

	Western Serbia	.189	.079	.101	-.02	.40
Eastern Serbia	Belgrade	-.376*	.072	.000	-.57	-.19
	Vojvodina	-.212*	.076	.030	-.41	-.01
	Western Serbia	-.024	.077	1.000	-.23	.18
Western Serbia	Belgrade	-.352*	.075	.000	-.55	-.15
	Vojvodina	-.189	.079	.101	-.40	.02
	Eastern Serbia	.024	.077	1.000	-.18	.23

*. The mean difference is significant at the 0.05 level.

Table 21: Factor analysis

Items	Factor loadings		
I know how to:	1	2	3
Factor 1: Advanced skills			
8. install and run applications	0.554		
13. communicate with others using e-mail	0.681		
14. use hyperlinks, menus and other navigation elements of a website	0.892		
15. open, read and save data in files	0.888		
16. work with files and folders	0.935		
17. recognize when there is a technical problem with the device that I am using	0.819		
18. solve simple technical problems with the device that I am using	0.883		
19. ask for help when I come across a technical issue that I can't solve by myself	0.588		
20. use applications to enter, edit and format data	0.909		
21. capture and reproduce images, sound and video	0.798		
22. fill out a digital form on the website	0.937		
23. pay for services over the Internet	0.71		
24. use digital devices and Internet services safely	0.855		

25. download files from the Internet website and save it on my device	0.956		
26. print a file that I have on my computer	0.815		
27. scan a document and save it on the computer	0.775		
28. send an electronic document via e-mail	0.771		
Factor 2: Basic skills			
1. power on a computer		0.970	
2. power on a smart phone		0.926	
3. power on a tablet		0.805	
4. use mouse and keyboard		0.959	
5. use a touchscreen		0.818	
6. use and set accessibility tools		0.627	
7. connect to the Internet		0.795	
9. use an Internet browser		0.76	
10. find information on the Internet by using a search engine		0.798	
11. communicate with others via mobile phone		0.89	
12. to communicate with others via VOIP services (Skype, Viber)		0.616	
Factor 3: Specialized skills			
29. use a digital certificate			.907
30. electronically sign a document			.931
Eigenvalue	19.88	2.5	1.01
Proportion of variance explained	66.26	8.33	3.36
Cronbach's alpha	0.979	0.963	0.94

Table 22: Descriptives for composite variables

	Mean	Std. Deviation
Basic E-government Skills	4.5018	0.9241
Advanced E-government Skills	3.9199	1.21774
Specialized E-government Skills	3.0098	1.6613

Table 23: Results of T-test for identified factors

Gender	Factor loadings		
	1	2	3
	Mean		
Male	3.82	4.41	2.99
Female	3.99	4.57	3.02
	T-test		
	T= -3.678	T=-4.886	T=-0.481
	P<0.001	P<0.001	P=0.467

Table 24: Results of one-way ANOVA differences between age groups

Age group	Factor loadings		
	1	2	3
	Mean		
Below 18	4.24	4.88	2.96
18 to 24	4.46	4.8	3.47
25 to 34	4.47	4.79	3.64
35 to 44	4.23	4.69	3.28
45 to 54	3.78	4.52	2.85
55 to 64	3.31	4.2	2.46
65 plus	1.9	2.73	1.33
	ANOVA		
	F=184.716	F=178.032	F=64.626
	P<0.001	P<0.001	P<0.001

Table 25: Multiple comparison Bonferroni for Basic e-government skills factor

(I) Age group		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
below 18	18 to 24	.07534	.08193	1.000	-.1738	.3245
	25 to 34	.08799	.07461	1.000	-.1389	.3149
	35 to 44	.19380	.07269	.162	-.0272	.4148
	45 to 54	.36383*	.07431	.000	.1379	.5898
	55 to 64	.67831*	.07477	.000	.4509	.9057
	65 plus	2.15071*	.09099	.000	1.8740	2.4274
18 to 24	below 18	-.07534	.08193	1.000	-.3245	.1738
	25 to 34	.01266	.05900	1.000	-.1667	.1921
	35 to 44	.11847	.05655	.762	-.0535	.2904
	45 to 54	.28850*	.05862	.000	.1102	.4668
	55 to 64	.60297*	.05921	.000	.4229	.7830
	65 plus	2.07538*	.07870	.000	1.8361	2.3147
25 to 34	below 18	-.08799	.07461	1.000	-.3149	.1389
	18 to 24	-.01266	.05900	1.000	-.1921	.1667
	35 to 44	.10581	.04530	.411	-.0319	.2436
	45 to 54	.27584*	.04786	.000	.1303	.4214
	55 to 64	.59032*	.04858	.000	.4426	.7380
	65 plus	2.06272*	.07104	.000	1.8467	2.2787
35 to 44	below 18	-.19380	.07269	.162	-.4148	.0272
	18 to 24	-.11847	.05655	.762	-.2904	.0535
	25 to 34	-.10581	.04530	.411	-.2436	.0319
	45 to 54	.17003*	.04481	.003	.0338	.3063
	55 to 64	.48451*	.04557	.000	.3459	.6231
	65 plus	1.95691*	.06902	.000	1.7470	2.1668
45 to 54	below 18	-.36383*	.07431	.000	-.5898	-.1379
	18 to 24	-.28850*	.05862	.000	-.4668	-.1102
	25 to 34	-.27584*	.04786	.000	-.4214	-.1303
	35 to 44	-.17003*	.04481	.003	-.3063	-.0338

	55 to 64	.31447*	.04812	.000	.1682	.4608
	65 plus	1.78688*	.07073	.000	1.5718	2.0020
55 to 64	below 18	-.67831*	.07477	.000	-.9057	-.4509
	18 to 24	-.60297*	.05921	.000	-.7830	-.4229
	25 to 34	-.59032*	.04858	.000	-.7380	-.4426
	35 to 44	-.48451*	.04557	.000	-.6231	-.3459
	45 to 54	-.31447*	.04812	.000	-.4608	-.1682
	65 plus	1.47241*	.07122	.000	1.2559	1.6890
65 plus	below 18	-2.15071*	.09099	.000	-2.4274	-1.8740
	18 to 24	-2.07538*	.07870	.000	-2.3147	-1.8361
	25 to 34	-2.06272*	.07104	.000	-2.2787	-1.8467
	35 to 44	-1.95691*	.06902	.000	-2.1668	-1.7470
	45 to 54	-1.78688*	.07073	.000	-2.0020	-1.5718
	55 to 64	-1.47241*	.07122	.000	-1.6890	-1.2559

*. The mean difference is significant at the 0.05 level.

Table 26: Multiple comparison Bonferroni for Advanced e-government skills factor

(I) Age group		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
below 18	18 to 24	-.22470	.10742	.767	-.5513	.1019
	25 to 34	-.23807	.09782	.315	-.5355	.0594
	35 to 44	.00205	.09530	1.000	-.2877	.2918
	45 to 54	.46031*	.09743	.000	.1640	.7566
	55 to 64	.92318*	.09804	.000	.6251	1.2213
	65 plus	2.33828*	.11929	.000	1.9755	2.7010
18 to 24	below 18	.22470	.10742	.767	-.1019	.5513
	25 to 34	-.01337	.07736	1.000	-.2486	.2219
	35 to 44	.22675*	.07415	.047	.0013	.4522
	45 to 54	.68501*	.07686	.000	.4513	.9187
	55 to 64	1.14788*	.07763	.000	.9118	1.3839
	65 plus	2.56298*	.10318	.000	2.2492	2.8767

25 to 34	below 18	.23807	.09782	.315	-.0594	.5355
	18 to 24	.01337	.07736	1.000	-.2219	.2486
	35 to 44	.24012*	.05940	.001	.0595	.4207
	45 to 54	.69838*	.06276	.000	.5076	.8892
	55 to 64	1.16125*	.06369	.000	.9676	1.3549
	65 plus	2.57635*	.09315	.000	2.2931	2.8596
35 to 44	below 18	-.00205	.09530	1.000	-.2918	.2877
	18 to 24	-.22675*	.07415	.047	-.4522	-.0013
	25 to 34	-.24012*	.05940	.001	-.4207	-.0595
	45 to 54	.45826*	.05876	.000	.2796	.6369
	55 to 64	.92113*	.05975	.000	.7394	1.1028
	65 plus	2.33623*	.09050	.000	2.0610	2.6114
45 to 54	below 18	-.46031*	.09743	.000	-.7566	-.1640
	18 to 24	-.68501*	.07686	.000	-.9187	-.4513
	25 to 34	-.69838*	.06276	.000	-.8892	-.5076
	35 to 44	-.45826*	.05876	.000	-.6369	-.2796
	55 to 64	.46287*	.06309	.000	.2710	.6547
	65 plus	1.87797*	.09274	.000	1.5960	2.1600
55 to 64	below 18	-.92318*	.09804	.000	-1.2213	-.6251
	18 to 24	-1.14788*	.07763	.000	-1.3839	-.9118
	25 to 34	-1.16125*	.06369	.000	-1.3549	-.9676
	35 to 44	-.92113*	.05975	.000	-1.1028	-.7394
	45 to 54	-.46287*	.06309	.000	-.6547	-.2710
	65 plus	1.41510*	.09337	.000	1.1312	1.6990
65 plus	below 18	-2.33828*	.11929	.000	-2.7010	-1.9755
	18 to 24	-2.56298*	.10318	.000	-2.8767	-2.2492
	25 to 34	-2.57635*	.09315	.000	-2.8596	-2.2931
	35 to 44	-2.33623*	.09050	.000	-2.6114	-2.0610
	45 to 54	-1.87797*	.09274	.000	-2.1600	-1.5960
	55 to 64	-1.41510*	.09337	.000	-1.6990	-1.1312

*. The mean difference is significant at the 0.05 level.

Table 27: Multiple comparison Bonferroni test for Specialized e-government skills factor for difference between the age groups

(I) Age group		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
below 18	18 to 24	-.50892*	.16187	.035	-1.0011	-.0167
	25 to 34	-.68338*	.14740	.000	-1.1316	-.2352
	35 to 44	-.32696	.14361	.480	-.7636	.1097
	45 to 54	.11242	.14682	1.000	-.3340	.5589
	55 to 64	.49591*	.14773	.017	.0467	.9451
	65 plus	1.61924*	.17976	.000	1.0726	2.1659
18 to 24	below 18	.50892*	.16187	.035	.0167	1.0011
	25 to 34	-.17445	.11657	1.000	-.5289	.1800
	35 to 44	.18196	.11173	1.000	-.1578	.5217
	45 to 54	.62134*	.11583	.000	.2691	.9735
	55 to 64	1.00483*	.11698	.000	.6491	1.3605
	65 plus	2.12816*	.15548	.000	1.6554	2.6009
25 to 34	below 18	.68338*	.14740	.000	.2352	1.1316
	18 to 24	.17445	.11657	1.000	-.1800	.5289
	35 to 44	.35642*	.08950	.001	.0843	.6286
	45 to 54	.79580*	.09457	.000	.5082	1.0833
	55 to 64	1.17929*	.09597	.000	.8875	1.4711
	65 plus	2.30261*	.14036	.000	1.8758	2.7294
35 to 44	below 18	.32696	.14361	.480	-.1097	.7636
	18 to 24	-.18196	.11173	1.000	-.5217	.1578
	25 to 34	-.35642*	.08950	.001	-.6286	-.0843
	45 to 54	.43938*	.08854	.000	.1702	.7086
	55 to 64	.82287*	.09004	.000	.5491	1.0967
	65 plus	1.94619*	.13637	.000	1.5315	2.3609
45 to 54	below 18	-.11242	.14682	1.000	-.5589	.3340
	18 to 24	-.62134*	.11583	.000	-.9735	-.2691
	25 to 34	-.79580*	.09457	.000	-1.0833	-.5082
	35 to 44	-.43938*	.08854	.000	-.7086	-.1702

	55 to 64	.38349*	.09507	.001	.0944	.6726
	65 plus	1.50681*	.13975	.000	1.0819	1.9318
55 to 64	below 18	-.49591*	.14773	.017	-.9451	-.0467
	18 to 24	-1.00483*	.11698	.000	-1.3605	-.6491
	25 to 34	-1.17929*	.09597	.000	-1.4711	-.8875
	35 to 44	-.82287*	.09004	.000	-1.0967	-.5491
	45 to 54	-.38349*	.09507	.001	-.6726	-.0944
	65 plus	1.12332*	.14070	.000	.6955	1.5512
65 plus	below 18	-1.61924*	.17976	.000	-2.1659	-1.0726
	18 to 24	-2.12816*	.15548	.000	-2.6009	-1.6554
	25 to 34	-2.30261*	.14036	.000	-2.7294	-1.8758
	35 to 44	-1.94619*	.13637	.000	-2.3609	-1.5315
	45 to 54	-1.50681*	.13975	.000	-1.9318	-1.0819
	55 to 64	-1.12332*	.14070	.000	-1.5512	-.6955

*. The mean difference is significant at the 0.05 level.

Table 28: Results of one-way ANOVA differences levels of education

Level of education	Factor loadings		
	1	2	3
	Mean		
Primary school	2.02	2.92	1.56
Secondary school	3.06	4.38	2.59
College	4.02	4.6	3.01
University	4.5	4.83	3.65
	ANOVA		
	F=354.55 P<0.001	F=308.65 P<0.001	F=143.80 P<0.001

Table 29: Multiple comparison Bonferroni test difference between the levels of education

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Mean Basic E-government Skills	primary school	secondary school	-1.46626*	.06441	.000	-1.6363	-1.2962
		college	-1.68245*	.07069	.000	-1.8691	-1.4958
		university	-1.91751*	.06443	.000	-2.0876	-1.7474
	secondary school	primary school	1.46626*	.06441	.000	1.2962	1.6363
		college	-.21619*	.04463	.000	-.3340	-.0984
		university	-.45124*	.03387	.000	-.5407	-.3618
	college	primary school	1.68245*	.07069	.000	1.4958	1.8691
		secondary school	.21619*	.04463	.000	.0984	.3340
		university	-.23506*	.04466	.000	-.3530	-.1171
	university	primary school	1.91751*	.06443	.000	1.7474	2.0876
		secondary school	.45124*	.03387	.000	.3618	.5407
		college	.23506*	.04466	.000	.1171	.3530
Mean Advanced E-government Skills	primary school	secondary school	-1.58542*	.08340	.000	-1.8056	-1.3652
		college	-2.00186*	.09152	.000	-2.2435	-1.7602
		university	-2.48367*	.08342	.000	-2.7039	-2.2634
	secondary school	primary school	1.58542*	.08340	.000	1.3652	1.8056
		college	-.41644*	.05779	.000	-.5690	-.2639
		university	-.89825*	.04386	.000	-1.0140	-.7825
	college	primary school	2.00186*	.09152	.000	1.7602	2.2435
		secondary school	.41644*	.05779	.000	.2639	.5690
		university	-.48181*	.05783	.000	-.6345	-.3291
	university	primary school	2.48367*	.08342	.000	2.2634	2.7039
		secondary school	.89825*	.04386	.000	.7825	1.0140
		college	.48181*	.05783	.000	.3291	.6345
Mean Specialized E-	primary school	secondary school	-1.03593*	.12412	.000	-1.3636	-.7082
		college	-1.44633*	.13621	.000	-1.8059	-1.0867

government Skills		university	-2.09099*	.12416	.000	-2.4188	-1.7632
	secondary school	primary school	1.03593*	.12412	.000	.7082	1.3636
		college	-.41040*	.08601	.000	-.6375	-.1833
		university	-1.05506*	.06527	.000	-1.2274	-.8827
	college	primary school	1.44633*	.13621	.000	1.0867	1.8059
		secondary school	.41040*	.08601	.000	.1833	.6375
		university	-.64466*	.08606	.000	-.8719	-.4174
	university	primary school	2.09099*	.12416	.000	1.7632	2.4188
		secondary school	1.05506*	.06527	.000	.8827	1.2274
		college	.64466*	.08606	.000	.4174	.8719

*. The mean difference is significant at the 0.05 level.

Table 30: Results of one-way ANOVA differences between the regions

Region	Factor loadings		
	1	2	3
	Mean		
Belgrade	4.15	4.67	3.09
Vojvodina	3.89	4.54	2.91
Eastern Serbia	3.8	4.34	3.01
Western Serbia	3.79	4.44	2.98
	ANOVA		
	F=15.237 P<0.001	F=18.345 P<0.001	

Table 31: Multiple comparison Bonferroni test difference between the regions for factor 1

(I) Region		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Belgrade	Vojvodina	.13145*	.04771	.035	.0055	.2574
	Eastern Serbia	.32783*	.04616	.000	.2060	.4497
	Western Serbia	.23389*	.04826	.000	.1065	.3613
Vojvodina	Belgrade	-.13145*	.04771	.035	-.2574	-.0055
	Eastern Serbia	.19638*	.04848	.000	.0684	.3244
	Western Serbia	.10245	.05049	.255	-.0308	.2357
Eastern Serbia	Belgrade	-.32783*	.04616	.000	-.4497	-.2060
	Vojvodina	-.19638*	.04848	.000	-.3244	-.0684
	Western Serbia	-.09394	.04902	.333	-.2234	.0355
Western Serbia	Belgrade	-.23389*	.04826	.000	-.3613	-.1065
	Vojvodina	-.10245	.05049	.255	-.2357	.0308
	Eastern Serbia	.09394	.04902	.333	-.0355	.2234

*. The mean difference is significant at the 0.05 level.

Table 32: Multiple comparison Bonferroni test difference between the regions for factor 2

(I) Region		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Belgrade	Vojvodina	.26458*	.06297	.000	.0983	.4308
	Eastern Serbia	.35102*	.06092	.000	.1902	.5118
	Western Serbia	.36502*	.06369	.000	.1969	.5332
Vojvodina	Belgrade	-.26458*	.06297	.000	-.4308	-.0983
	Eastern Serbia	.08643	.06399	1.000	-.0825	.2554
	Western Serbia	.10044	.06663	.791	-.0755	.2764
Eastern Serbia	Belgrade	-.35102*	.06092	.000	-.5118	-.1902
	Vojvodina	-.08643	.06399	1.000	-.2554	.0825
	Western Serbia	.01401	.06470	1.000	-.1568	.1848
Western Serbia	Belgrade	-.36502*	.06369	.000	-.5332	-.1969
	Vojvodina	-.10044	.06663	.791	-.2764	.0755
	Eastern Serbia	-.01401	.06470	1.000	-.1848	.1568

*. The mean difference is significant at the 0.05 level.

Table 33: Multiple comparison Bonferroni test difference between the regions for factor 3

(I) Region		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Belgrade	Vojvodina	.17608	.08652	.252	-.0523	.4045
	Eastern Serbia	.07658	.08370	1.000	-.1444	.2976
	Western Serbia	.10815	.08751	1.000	-.1229	.3392
Vojvodina	Belgrade	-.17608	.08652	.252	-.4045	.0523
	Eastern Serbia	-.09950	.08792	1.000	-.3316	.1326
	Western Serbia	-.06792	.09155	1.000	-.3096	.1738
Eastern Serbia	Belgrade	-.07658	.08370	1.000	-.2976	.1444
	Vojvodina	.09950	.08792	1.000	-.1326	.3316
	Western Serbia	.03158	.08889	1.000	-.2031	.2663
Western Serbia	Belgrade	-.10815	.08751	1.000	-.3392	.1229
	Vojvodina	.06792	.09155	1.000	-.1738	.3096
	Eastern Serbia	-.03158	.08889	1.000	-.2663	.2031